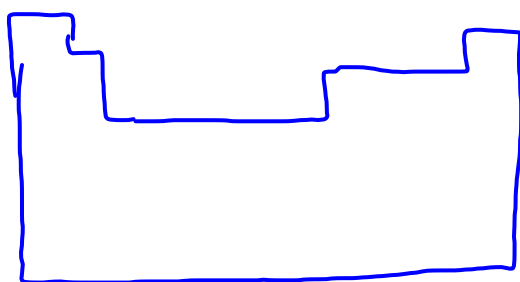


Specific Families Continued:

Group 18 → Noble Gases

- All exist as gases
- Not reactive because they already have a full valence shell
- He has $2e^-$ to make full valence shell
- All others have $8e^-$ in their valence shell



Lanthanide Series
Actinide Series

- Rare Earth Metals

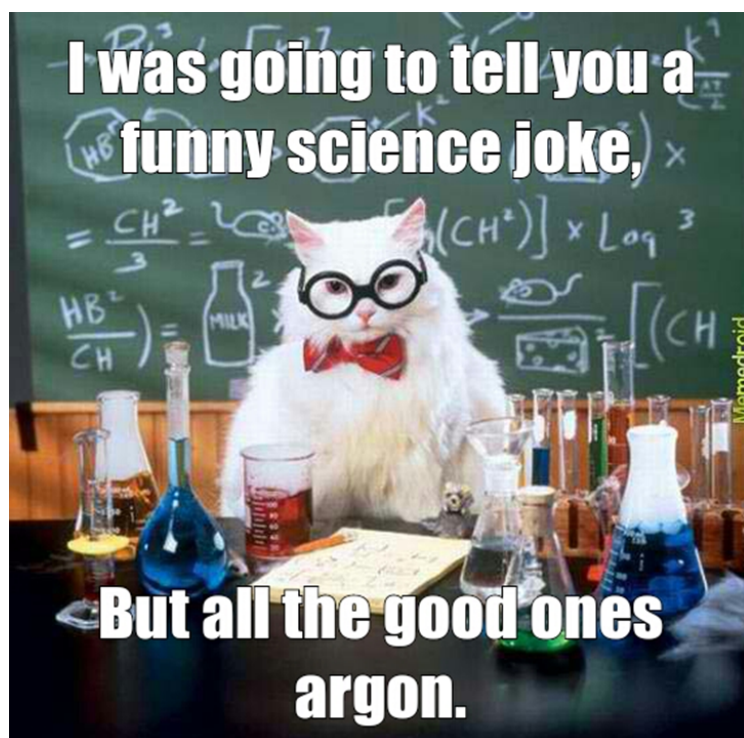
- Some are radioactive
- Appearance of silver, silvery-white, or gray
- Conduct electricity and heat

Oxidation Numbers:

- All elements want to be "happy"
- Atoms want to have stable outer energy level \rightarrow then they are "happy"
- How do they become happy?
 - Atoms gain or lose electrons in order to become stable
 - Usually the most stable configurations involve 8 valence e^-
 - $8 e^- = \text{full octet}$

Octet Rule:

- Atoms will form bonds with other atoms in order to have 8 valence electrons
- Either share or transfer e^-
- Noble gases do not bond with other elements because they already have a full octet



Oxidation Numbers:

- The oxidation number indicates how many e^- are gained or lost.

- Range from -4 to $+4$.

- Predicting Oxidation Numbers:

1. Determine # valence e^- of a neutral atom

2. Determine if atom will gain or lose e^-

– Which would be faster: going to \emptyset or to 8?

3. Count # e^- gained or lost.

– Lose e^- , charge is positive (+)

– Gain e^- , charge is negative (-)

1+																		0					
H 1	2+																	3+	4+	3-	2-	1-	He 2
Li 3	Be 4	Transistion metals - variable oxidation numbers										B 5	C 6	N 7	O 8	F 9	Ne 10						
Na 11	Mg 12											Al 13	Si 14	P 15	S 16	Cl 17	Ar 18						
K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36						
Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48	In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54						

- Chemical Stability:
 - Noble gases are most stable.
 - Have 8 valence e^- , so they neither gain nor lose e^- .
- Chemical Bonds:
 - Only involve electrons! Nucleus does not matter here.
 - The electrons literally move from one atom to the other.
(Ionic Bonding)
 - There will always be AT LEAST 2 atoms involved in the process.
 - Binary compound = ONLY 2 elements
 - Examples: NaCl , CaCl_2 , K_2S

• Types of Chemical Bonds:

- Three different ways chemicals interact or BOND
- The bonding will always end in a new COMPOUND with new chemical properties
- Types:
 - Ionic
 - Covalent
 - Metallic

- Ionic Bonds:
 - Formed when one atom gives away e^- and other atom takes e^-

